consuming population of the world during the last fifty years. This increase amounts apparently to more than 90 per cent., and some further allowance should also, in the author's opinion, be made for the rise in the standard of living not only in Europe, but also in Asiatic and tropical countries. One of the chief causes for this increase appears to be the less frequent occurrence of devastating wars as compared with earlier times. Also the opening up of vast new regions of agricultural productiveness encouraged the growth of the meat-consuming population outside Europe, while the development of cheap transport, enabling the surplus foodstuffs and feedstuffs of these new countries to be carried to other regions where local supplies were deficient, had a great effect in making possible the increase of the industrial populations in Europe. From a study of the production and consumption of animal foodstuffs it becomes clear that the supply of these is likely to be considerably less than the demand. The author states that this is due to three causes: Owing to the comparative lack of undeveloped fertile regions, the rate of expansion in the surplus production of pasture-fed meat animals and of concentrated feedstuffs from the new overseas countries is slowing down; the white meat-consuming population has increased; with the general improvements in the financial status of industrial and agricultural workers in Europe, their *per capita* consumption of animal foodstuffs tends to rise.

Part iii. of the book is concerned with the above problems as they affect the British Empire. The study of the Empire's deficiencies, both in animal foodstuffs and feedstuffs, points throughout to its lack of widespread intensive systems of agriculture, for, though land resources are abundant, they remain more or less undeveloped in large areas. The author emphasises the fact that throughout those parts of the Empire inhabited by white people only a relatively small proportion are engaged in agriculture, and they work on the extensive instead of the intensive system. His conclusion is:—

> "The Empire, as a whole, requires to have an enormously increased area under cultivation for the production of feedstuffs, not only to make good its deficiency in this direction, but also to provide for the maintenance of food-producing animals and of poultry in much larger numbers than at present, if it is to cover in a more satisfactory way its deficiency in meat, dairy produce, and eggs."

A valuable feature of the book lies in the summaries which occur at the end of nearly every chapter in Part iii., while for Parts i. and ii. the author gives a full summary of the conclusions to be drawn from the general study of the question of food production and consumption.

Life and Lore of Birds.

The Heron of Castle Creek and Other Sketches of Bird Life. By A. W. Rees. With a memoir of the author by J. K. Hudson. Pp. xi+218. (London: John Murray, 1920.) Price 7*s*. 6*d*. net.

A MELANCHOLY interest is attached to this volume, inasmuch as its gifted author selected the articles, which had previously appeared in various serial publications, for re-issue in book form, but did not live to complete their final revision for the press. This task was undertaken by his literary executor and successfully carried through with so satisfactory a result that we are glad to know that sufficient of Mr. Rees's writings still remain to form another of these delightful volumes.

Most of the essays in the series now before us are devoted to bird-life, the various phases of which are graphically described from the personal observations of the author, who did not trust to books for his knowledge, but gleaned his information at first hand from the creatures he loved. The engaging style of writing and the accuracy of the author's notes on the lives and loves of the birds and beasts he watched disarm criticism and form engrossing reading. It is difficult to single out any particular essay as of outstanding interest, but the account of the parent kingfishers teaching their brood to dive for minnows is original, amusing, and instructive, while the observations on the dipper, the efforts of the author to find its nest, and the affection shown by these birds for their mates, entirely captivate the reader. When a cock offered his tribute of a large worm to his lady-love, the author felt, as he watched its antics, that he "could recognise a sentiment subtly different from mere animal passion," and goes on to say:—

> "In those rare brief periods of outdoor study when, to my surprise and delight, I have caught a glimpse of what, for want of a better phrase, might be termed the humanity of Nature, I have not merely imagined, but have felt sure, that many of the finest feelings of man—pity, sympathy, devotion, unselfish comradeship—are shared in no small measure by creatures considered to be far beneath our plane of life."

Five essays are given on the life of the partridge at various periods of the year, and these

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are so graphically penned that one fancies oneself at the author's side, watching intently the behaviour of these attractive birds, and sharing with them the hopes, fears, and passions incidental to all stages of their brief career in the open, fraught as it is with constant danger from hawk, weasel, fox, or sportsman, and yet alleviated by the intense joys inseparable from the sharing with a mate the important duties of founding a home and rearing a brood of tiny fledglings. The book is not without its humorous side too, as the reader will discover when smiling over the "Misadventures of Bird-watching." While the author is endeavouring to identify a pair of warblers and to find their nest, he is himself closely watched, in the first place, by a puzzled keeper, who suspects him of poaching, and, secondly, by an angry bull in unpleasant proximity, to escape the unwelcome attentions of which the enthusiastic naturalist has perforce to bring into action his fullest powers of strategy.

This well-printed and unusually attractive volume can be recommended to the notice of all lovers of Nature and Nature-lore, and the appearance of a further series of posthumous essays will be very welcome.

Our Bookshelf.

Engineering Descriptive Geometry and Drawing. By Capt. Frank W. Bartlett and Prof. Theodore W. Johnson. Part i. Pp. vii + 206. Part ii. Pp. v + 207–374. Part iii. Pp. v + 375–617 + xiv plates. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1919.) Price 27*s*. 6*d*. net.

THIS book gives in full detail the elementary courses of engineering drawing as taught to young midshipmen in the Navy of the United States of America. The instruction is arranged on the assumption that the student is quite without knowledge or experience in the handling of drawing instruments. Part i., occupying about a third of the volume, treats of line drawing in pencil and in ink, lettering, the use and care of instruments and scales, and describes in the minutest detail all the "tricks of the tool's true play" as witnessed in the practice of the draughtsman's art. In these pages the learner has virtually at his elbow, for constant reference, the skilled craftsman and the experienced teacher. His progress should be sure and rapid, even without much help from an instructor.

In part ii. the principles of projection and descriptive geometry are unfolded in close relation to the special needs of engineers.

Part iii. is perhaps the most important section, and the fourteen plates at the end give standard dimensions of such things as bolts, nuts, rivets, pipes, rolled sections, etc., as adopted by the bureaux of the U.S. Navy Department. We have in this part a finely graduated scheme of work in which the student executes finished drawings of machine details from his own dimensioned hand sketches of the actual parts; becomes familiar with the tables of standards; is trained in the reading of drawings, etc. Although the instructions are again minute and full, almost sufficient for self-tuition, there is no suspicion of spoon-feeding, and the student is left more and more to his own resources as he becomes fit. There are chapters on ships' lines and on structural steel and iron work.

The treatment of the subject has been evolved gradually and embodies the results of much experience in class work. It is characterised by thoroughness, and the text-book is a model of what such a book should be. The volume ought to be in the library of every technical school and drawing class in this country. Teachers as well as students could learn much from it.

Intermediate Text-book of Magnetism and Electricity. By R. W. Hutchinson. Pp. viii + 620. (London: W. B. Clive; University Tutorial Press, Ltd., 1920.) Price 8*s*. 6*d*.

THE writer of a book such as this is a little handicapped by having to work in accordance with schemes laid down by boards of examiners, and has not quite a free hand in the arrangement and development of his material. Covering the subject up to the "Intermediate" standard, the work is suitable more to the science student than to the future electrical engineer, and in view of the vastness of the field the author has been obliged to cut down the practical parts of the subject in order to provide space for the more academical sections. It is not his fault that the pith ball is made as important as the dynamo. Nevertheless, we would urge that it is as essential for the science student as for the engineer to "think in volts and amperes" before he attempts to grasp subtler refinements, and we should have liked to see Ohm's law and the conception of resistance introduced earlier than p. 304. In the author's treatment of magnetism, on the other hand, with which he commences his volume, he boldly brings his reader face to face with the equation $B = 4\pi I + H$ as early as p. 31, adopting "an introductory elementary treatment to acquaint the reader with the general meaning of the terms in use," and giving the fuller treatment in its proper place later. The idea is excellent, and a similar scheme might have been applied to electric currents with advantage.

Taken all round, the work is painstaking and is skilfully compiled. Special attention should be directed to the three concluding chapters on electrical oscillations, passage of electricity through gases, and radio-activity respectively, which form admirable introductions to the portions of the subject founded on the more modern researches in physics.

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